

Amendments to the Drawings:

Figure 11 has been amended to show the feature set forth in original claim 8.

Attachment: Replacement Sheet

REMARKS

By this amendment, Applicants have amended Figure 11 to show the feature recited in original claim 8 and described at, e.g., page 13, lines 8-11 of Applicants' specification, i.e., that the electronic circuit apparatus is fixed on the interior of an automatic transmission assembly of an automobile, and that the cooling medium is a transmission fluid. In doing so, Applicants have schematically shown the transmission assembly as element 43 and have amended page 13, line 10 of the specification to make reference to element 43.

Applicants have also amended the claims to more clearly define their invention. In particular, claim 1 has been amended to correct a typographical error, claim 12 canceled, new claims 21-29 added, and claims 8-11 amended to depend from claim 22. Claim 21 corresponds to independent claim 1 but changes the preamble to "an automobile control unit." Claims 22-29 correspond to claims 17, 13-16 and 18-20, respectively, but ultimately depend from claim 21. The term "automobile control unit" is supported by, e.g., the disclosure at page 2, lines 23-24 and 27 of Applicants' specification.

In view of the cancellation of claim 12 and the amendment to Figure 11, it is submitted the drawings now show every feature of the invention specified in the claims. Accordingly, reconsideration and withdrawal of the objection to the drawings under 37 CFR 1.83(a) on page 2 of the Office Action are requested.

The Examiner has rejected claim 8 under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the enablement requirement and containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. This rejection is traversed.

Claim 8 is supported by an enabling disclosure that can be found at, e.g.,

page 13, lines 8-12 of Applicants' specification. Therefore, reconsideration and withdrawal of the rejection of claim 8 are requested.

Claims 1, 7, 8, 11-16 and 18-20 stand rejected under 35 U.S.C. 112, second paragraph, in view of the word "polyimide" previously recited at line 4 of claim 1. Noting the correction of the spelling of "polymide" to read --polyimide--, this rejection is moot.

Claims 1, 7, 11, 14, 16, 18 and 19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over combination of U.S. Patent No. 6,049,975 to Clayton, U.S. Patent No. 6,023,098 to Higashiguchi et al. and U.S. Patent Application Publication No. 2003/0137032 A1 to Abbott. Applicants traverse this rejection and request reconsideration thereof.

It is an object of the present invention to realize high-density mounting, high heat-dissipating characteristics, and high reliability all at the same time in an electric circuit apparatus such as an automobile control unit that is required to provide heat resistance and hermetic sealing under a harsh environment. The electronic circuit apparatus, e.g., the automobile control unit, of the present invention has a great current value and a complicated electric circuit. Thus, it is effective to adopt a multilayered wiring board as the wiring board from the viewpoint of high density mounting. However, since such an automobile control unit is used in a high-temperature environment, a multilayered wiring board does not readily allow sufficient dissipation of heat from the heat sink. Hence, the present invention adopts a structure that a multilayered wiring board is fixed to one surface of the heat sink and a polyimide wiring board with excellent heat-dissipating characteristics is fixed to the other surface of the heat sink, and that a heat generating component is mounted on the polyimide wiring board with excellent heat-dissipating characteristics. The present invention thereby enables realization of high density mounting and heat-

dissipating characteristics in a harsh environment where high levels of heat resistance and hermetic sealing are required.

In contrast, the patent to Clayton discloses a multichip module having a structure that a circuit board 50 mounted with a plurality of semiconductor devices 54 that adheres to a metal cover plate 48. In addition, the publication also discloses, as the circuit board 50, a flexible wiring circuit board consisting of polyamide and copper. However, Clayton does not disclose application of such a circuit board to an automobile control unit and the use thereof in a high-temperature environment. Moreover, Clayton does not disclose a structure obtained by disposing the circuit boards 50 on both surfaces of the cover plate 48. Furthermore, Clayton does not disclose the combined use of a multilayered wiring board and a polyimide wiring board, whereby the multilayered wiring board is disposed on one surface of the cover plate 48 and the polyimide wiring board is disposed on the other surface thereof, and whereby a heat generating component is mounted on the polyimide wiring board.

Persons of ordinary skill in the art could not easily have conceived of the automobile control unit of the present invention that realizes high-density mounting and heat-dissipating characteristics, based on the multichip module described in Clayton, which does not take into consideration application of such a circuit board to an automobile control unit and the use thereof in a high-temperature environment.

The Higashiguchi et al. patent discloses a semiconductor device having terminals for heat radiation. This patent has been cited by the Examiner for its teachings that the flexible circuit boards can be made polyimide films, polyester films, polycarbonate films or polyamide films. See, column 6, lines 4-6 of Higashiguchi et al. However, clearly nothing in Higashiguchi et al. remedies any of the deficiencies noted above with respect to Clayton.

The Abbott publication discloses a lead frame for use with integrated circuit chips comprising a base metal, using copper or a cooper alloy, having a modified surface adapted to provide bondability and solderability and adhesion to polymeric compounds. This document discloses that a molding compound encapsulates a mounted chip, bonding wires and first ends of leads segments, and that the molding compound is selected from a group consisting of epoxy-based thermoset molding compounds suitable for adhesion to the lead frame. However, it is submitted the Abbott publication does not remedy any of the basic deficiencies noted above with respect to Clayton and Higashiguchi et al.

Accordingly, the presently claimed invention is patentable over the proposed combination of Clayton, Higashiguchi et al. and Abbott.

Claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Clayton, Higashiguchi et al., Abbot and further in combination with U.S. Patent Application Publication No. 2002/0088304 to Thorum et al. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the Thorum et al. publication as allegedly disclosing an electronic circuit apparatus fixed on an interior of an automatic transmission assembly of an automobile. However, nothing in Thorum et al. would have provided any reason to modify the teachings of Clayton, Higashiguchi et al. and Abbot to arrive at the presently claimed invention. Accordingly, claim 8 is patentable over of the proposed combination references at least for the reasons noted above.

Claims 12, 13 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Clayton, Higashiguchi et al., Abbot and further in view of U.S. Patent No. 6,885,522 to Kira et al. Support of this rejection, the Examiner also makes reference to “paragraphs 59, 68-70, 72, 73, 74, 79, 82 and 100” of “Vargo.” Applicants traverse this rejection and request reconsideration thereof.

Since the Examiner cites the Kira patent in the statement of the rejection and refers to "Vargo" in the body of the rejection, the rejection is unclear and must be withdrawn or restated for this reason alone. In any event, it is submitted nothing in Kira remedies any of the basic deficiencies noted above with respect to Clayton, Higashiguchi et al. and Abbot. Accordingly, claims 13 and 15 are patentable over the proposed combination of references at least for the reasons noted above.

Claim 20 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Clayton, Higashiguchi et al., and Abbot and further in combination with U.S. Patent Application Publication No. 2006/0038284 to Brandenburg et al. Applicants traverse this rejection and request reconsideration thereof.

The Brandenburg et al. application was published on February 23, 2006 and based on an application filed on August 17, 2004, both dates being after applicants' U.S. filing date of March 17, 2004. Accordingly, it is submitted the Brandenburg publication is not prior art to the presently claimed invention. Accordingly, reconsideration and withdrawal of the rejection of claim 20 are requested.

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all the claims now in the application are requested.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus Deposit Account No. 01-2135 (Case: 1021.43671X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachments